REMARKS

By this Amendment, claims 1-5 are amended, claim 6 is canceled, and claims 7-13 are added. Support for the amendments and new claims is found in the original specification. See, for example, Figs. 4-9 and page 11, line 16 through page 12, line 26 for support for claims 1-5 and 7, and Figs. 10-12 and page 14, line 26 through page 16, line 22 for claims 8-13. No new matter is added.

In the Office Action, claims 1-5 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,949,161 to Nanba (Nanba) in view of Japanese patent publication 62-166764 (JP '764). Claim 6 is rejected over Nanba and JP '764 as applied to claim 1 and further in view of U.S. Patent 6, 367, 159 to Naoi et al. (Naoi). Reconsideration and withdrawal of the rejections are requested for the following reasons.

In the Office Action, the Examiner states that Nanba discloses a uniaxial drive unit having a fixed part of a rod shaped magnet 11 and a ring shaped moving part 21 with coils, but does not disclose a winding motion transmission member for a driving section slidable in the axial direction. JP '764 is cited as teaching of a driving section (balance weight) 16 for reducing vibration in office automation equipment with a winding transmission member 14 and a winding support member 13.

Naoi is added to address claim 6, now canceled, which was directed to a surface shape measuring apparatus. The Office Action states that Nanba as modified by JP '764 teaches of a drive unit, but does not disclose using it to measure the surface shape of an object. Naoi is cited as teaching the use of a small, precise linear motor to measure the surface of an object with sliders moving linearly along guide shafts. The Examiner asserts that Naoi and Nanba as modified by JP '764 are from the same field of endeavor and that it would have been obvious to have utilized a linear motor with a counter weight for reducing vibration of the system and thus improve the accuracy of measurement. As claim 1 is now directed to a surface shape measuring apparatus, Naoi is also addressed herein.

Claim 1, as amended, is directed to a surface shape measuring apparatus comprising a measurement bed in which an object under test is set on, a column which is vertically erected on the measurement bed, and a base plate which is vertically movable along the column. A drive unit moves the base plate vertically along the column. A linear motor is provided,

which includes a fixed part which is a rod-shaped magnet fixed to the base plate transversely and formed so that the N poles and the S poles are arranged alternately, and a moving part which is a ring-shaped member having a coil member, fitted on said fixed part, and capable of moving along said fixed part. A linear motion guide is provided parallel to the base plate, and a driving section is slidable in the transverse direction along the linear motion guide. A winding motion transmission support member is provided near ends of the linear motor, and a winding motion transmission member, which is wound around the winding motion transmission support member, connects the driving section to the moving part or a member fixed to the moving part and thereby transmits driving force of said linear motor to said driving section. A detecting section is fixed to the driving section, wherein the surface shape measuring apparatus measures a surface shape of an object under test by relatively moving the detecting section provided on the measurement bed along the surface of the object under test.

Nanba is a linear drive device that drives an object, such as a slider, carrying an optical part in an image reading apparatus for optically scanning and reading an original document. The linear drive device includes a guide member (shaft 11) extending linearly in a predetermined direction and a movable piece 21 engaged with the guide member for reciprocation in the determined direction. As recognized in the Office Action, there is no winding motion transmission member. JP '764 has a pair of pulleys 15 and an endless belt 17 with a balance weight 16 for office automation equipment. As seen in Figure 1, a mover 20 is attached to the belt and moves in one linear direction on rails on a base plate. The weight allows the mover to stop on an incline at a precise position.

Naoi is directed to a different type of device than the linear slide carriage of Nanba and JP '764 used for office automation equipment. Naoi is directed to a surface shape measuring method for measuring a thin element such as a silicon wafer. The thin element is supported to be rotatable within a single plane with first and second measuring means that independently move along first and second guide shafts to measure the opposed surfaces of the thin element. The guide shafts are horizontally disposed on either side of the vertical plane including the thin element and are parallel to each other. The thin element can be moved by vertically moving means that are disposed on either side of the thin element.

Measuring the surface shape of an element mounted for measurement, as in Naoi, is a different process than moving a carriage for scanning a document, as in Nanba. There is no suggestion in the prior art for using a linear drive device, as is used in Nanba's device to drive an object, such as a slider in a scanner, in an apparatus for measuring the surface shape of a rotatable object as in Naoi. Further, even if such a combination could be made, Naoi uses a guide rail, not a winding motion transmission member, and there is no suggestion in the prior art for changing Naoi's guide rail to a winding motion transmission member. Moreover, even if the combination could be made, the features of the claimed invention are not present in the proposed combination.

In particular, the combination lacks the following features of claim 1. None of the prior art taken alone or in combination shows a measurement bed, a column vertically erected on the measurement bed, a base plate vertically movable along the column, and a drive unit that moves the base plate vertically along the column, wherein a driving section is slidable in a transverse direction along a linear motion guide that is parallel to the base plate. Further, a linear motor with a winding motion transmission member that connects the driving section to a moving part in the linear motor to transmit the driving force of the linear motor to the driving section is not shown. Additionally, none of the prior art shows a detecting section fixed to a driving section with this combination of features such that a surface shape of an object is measured by relatively moving the detecting section provided on the measurement bed along the surface of the object.

As the combination of features is not shown or suggested in the applied prior art, claim 1 cannot be rendered obvious by this prior art, and the same is true for the claims which depend therefrom.

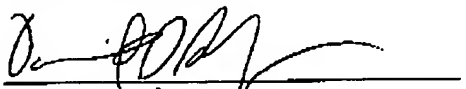
New independent claim 8 is directed to a surface shape measuring apparatus comprising a unit body having ends, a work table in which an object under test is set on and rotatably provided in the unit body, and a rotational driving device which rotates the work table. A linear motor is provided which includes a fixed part which is a rod-shaped magnet fixed to a unit body vertically and formed so that the N poles and the S poles are arranged alternately, and a moving part which is a ring-shaped member having a coil member, fitted on the fixed part, and capable of moving along the fixed part. A guide shaft is provided vertical to the unit body, and a driving section is vertically slidable along the guide shaft. A winding motion transmission support member is provided near an upper end or both ends of the unit

body. A winding motion transmission member, which is wound around the winding motion transmission support member, connects the driving section to the moving part or a member fixed to the moving part and thereby transmits driving force of the linear motor to the driving section. A measurement stage is vertically fixed on the driving section, and a horizontal arm is provided so as to be movable in a transverse direction with respect to the measurement stage. A detecting section is fixed to the horizontal arm, wherein the surface shape measuring apparatus measures a surface shape of an object under test by relatively moving the detecting section provided on the measurement bed along the surface of the object under test.

This combination of features is not shown in the applied prior art. In particular, none of the prior art has a rotatable work table, a winding motion transmission member that connects a driving section, which is fixed to a measurement stage, to the moving part of a linear motor to transmit driving force to the driving section, or a detecting section that is fixed to a horizontal arm, which is movable in a transverse direction with respect to the measurement stage. As these features are not shown or suggested in the prior art, claim 8 and its dependent claims are not rejectable on the basis set forth in the Examiner's Office Action.

While this application should now be in condition for allowance, in the event that any issues should remain after consideration of this response which could be addressed through discussions with the undersigned, then the Examiner is requested to contact the undersigned by telephone for that purpose.

Respectfully submitted,



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